welfare centres, are discussed, as are also the evil results of the artificial feeding of infants, and the need for greater care of illegitimate infants. There follow a series of beautifully executed statistical diagrams and illustrations of sanitary interest, which make this volume an admirably instructive picture-book. An abstract of legislation bearing on maternal and child welfare follows, and the remainder of the volume, from p. 113 to p. 427, is occupied by statistical summaries of maternal and child mortality in various towns in England and Wales, followed by comments and recommendations by the local medical officer of health, some of which are most useful.

The second volume is contributed by Dr. Janet Campbell, and deals with three subjects: midwives and midwifery, voluntary work for infant welfare, and play centres and playgrounds. The first of these sections contains an interesting sketch of the history of midwifery, and of the practice of midwifery at the present time in this and other countries. There follow useful suggestions for raising the standard of midwifery in England and Wales, under which heading are considered the questions of improved training, improved status, and improved financial position. The subject of midwifery practice in rural areas is specially discussed, and there is a short sketch of the important subject of maternity homes. There will be general agreement with the statement that, "even apart from real poverty, the accommodation in many reasonably clean and well-kept working-class homes is wholly inadequate for a well-conducted labour and lying-in." The parts dealing with voluntary work and play centres have much interest for those engaged in this important branch of child-welfare work, but need not be summarised here. This volume, like the one contributed by Dr. Hope, is lavishly illustrated by photographs, showing in this case the activities of baby welcomes, sewing classes, baby hospitals, infant nurseries, schools for mothers, etc.

A prefatory note is introduced on behalf of the Carnegie Trustees, in which, while expressing their appreciation of the importance of the subjects dealt with in the reports, they state that they do not commit themselves to the acceptance of the lines of policy or of the recommendations which have been submitted for their reconsideration. This was a necessary reservation, especially in view of the fact that it is understood that the Carnegie Trustees have under consideration the possible allocation of large sums of money to this or other objects of social importance. It may be hoped that they will discover means for utilising their resources to aid in the saving of maternal and infantile life and in the avoidance of unnecessary suffering of both mothers and infants, while stimulating local authorities to increase their present efforts to this end.

Dr. Hope, in his introductory remarks, points out three pressing necessities for which there is as yet no adequate provision, or prospect of making it. These are:—

(1) The provision of maternity homes.

(2) The establishment of welfare centres for pre-maternity and infancy and the need for greater care of illegitimate infants.

(3) Improvement in education in the various branches of the science of public health, and the encouragement of further research into the circumstances adversely affecting infancy and motherhood.

In a prefatory note contributed by Sir Arthur Newsholme, the principal medical officer of the Local Government Board, the first of these points is particularly emphasised. He points out that, although much improvement has occurred, it still remains true that on an average in England and Wales there occur week by week sixty-seven deaths of mothers as the result of pregnancy and parturition, and that a very large proportion of these are avoidable, as shown by the fact that in some areas the death-rate in connection with child-bearing is two, or even three, times as high as in others. The same is true of child mortality. In some towns the death-rate among infants under a month old is two or three times as high as in others; and the chief burden of these reports is said in this prefatory note to be

> the immediate need for further national effort to reduce sickness and mortality among child-bearing mothers and the closely related mortality among infants before birth and in the first month after live-birth.

This article may be closed by the quotation of a further sentence from the prefatory note by the medical officer of the Local Government Board:—

> Maternity homes are urgently needed, and I know of no social work so likely as the provision of such maternity homes to give immediate results in saving maternal and child life, in diminishing chronic invalidism of mothers, and in enhancing the national welfare.

We hope that these reports will have a wide circulation and will reach a wider public than the official reports on the same subject which have already been issued.

NOTES.

THE Treasury has informed the British Science Guild that the issue of the *Kew Bulletin* is to be continued subject to the omission of certain classes of information. The announcement was made in the House of Commons on July 4, when Sir William Beale, a member of the executive committee of the Guild, asked the Secretary to the Treasury "whether the question of continuing the printing and publishing of the *Kew Bulletin* had been reconsidered; and whether he can now give an assurance that this publication, or at least that part of it which is devoted to the spread of useful knowledge of plant culture and plant products throughout the Empire, will shortly be resumed?" Mr. Stanley Baldwin's reply was: "I am informed that the question of the suspension of the issue of the *Kew Bulletin* was considered by the Select Committee on Publication and Debates Reports last week, and that it was decided to recommend that the *Bulletin* should be continued, but with due regard to economy. Subject to the omission, therefore, of certain classes of information which, though doubtless of scientific interest, can, it is thought, be postponed without detriment to the welfare of the State, the publication of the *Bulletin* will be resumed." In reply to a question asked by

Viscount Bryce in the House of Lords on July 10, the Duke of Marlborough said that the editor would be entitled to consider what was essential and what could properly be omitted from the *Bulletin.*

IN view of the cancellation of the annual meeting of the British Association, it has been necessary to make special arrangements for carrying on the Association's current work. Meetings of the organising committees of the various sections, the delegates of corresponding societies, the committee of recommendations, and the general committee have therefore been held. It has been decided to continue Sir Arthur Evans in the presidency for another year, while the Hon. Sir C. A. Parsons, who would have presided over this year's meeting, will do so at the meeting which it is hoped will take place as arranged at Cardiff next year. The meeting this year would have been at Bournemouth, and that borough has repeated its invitation, which has been accepted, for 1919. Grants amounting to 286*l.* were made in aid of such researches as were regarded as essential to carry on, having regard to present conditions. The new members of the council of the Association are Dr. E. F. Armstrong, Mr. J. H. Jeans, Prof. A. Keith, Prof. W. H. Perkin, and Mr. W. Whitaker.

Le Temps of June 29 contains a full report of the discourse delivered by M. Alfred Capus on his election to the French Academy in the place vacant by the death of Henri Poincaré. The election of a man of letters to fill the place of a man of science might strike some people as strange, but M. Capus remarks that in France knowledge has never been reserved for some few "mandarins" any more than it has required an obscure language and esoteric formulæ, and recalled the example of Descartes. In fact, since the seventeenth century the education of the French middle class has always kept up both the scientific and the literary tendency. It is the custom for such a discourse to be devoted to the work and life of the particular predecessor, and so Poincaré's works, and particularly his books, "La Science et l'Hypothèse" and "La Valeur de la Science," are described with a light touch that, owing perhaps to its being a national characteristic, is not unlike the touch of Poincaré himself when he was dealing with subjects with which he was not very well acquainted.

IT was reported in the *Daily Chronicle* of June 20 that the Duchess of Somerset had stated that "as a result of gunfire sixty kinds of migratory birds had ceased to visit Britain." This report was so definite and remarkable that we communicated with her Grace, who informs us that what she stated was that her gardeners had said that this year there was only one bird for every sixty which were here last year, "from the effects of cold weather, etc." As many general statements have been made recently referring to the alleged absence of migratory birds in consequence of heavy gunfire and a prolonged winter, we communicated with Dr. W. Eagle Clarke, keeper of the Natural History Department of the Royal Scottish Museum, Edinburgh, and a leading authority upon bird migration. Dr. Clarke says: Not a single species of regular migratory bird has been absent from Britain since the war broke out. I am familiar with the whole of the data, from all parts of Scotland, relating to our seasonal bird-visitors for the past twenty-five years, and am able to state that this summer all our regular spring migrants are with us in their usual abundance. I have no information relating to the effect of gunfire on bird migration other than that so far as our islands are concerned it has had no influence whatever on the comings and goings of our feathered visitors."

WHEN a bomb is dropped from a moving aeroplane the point at which it strikes the earth depends primarily on its altitude above and speed with respect to the earth's surface, and to a smaller extent on the speed of the wind and the mass and surface of the bomb. In order to allow the aviator to drop his bomb on a given object, the most recent German aeroplanes are provided with an instrument made by Goerz which consists of a telescope kept vertical by means of a bubble of air in the eyepiece. By means of a movable prism below the objective the observer can adjust his instrument so that he sees through it objects at a given angle ahead or in the rear. The instrument is generally used when the aeroplane is moving against the wind. From the aneroid reading of the height of the aeroplane and the time taken to get vertically over an object seen previously 22·5° ahead, the speed of the aeroplane is known. The speed of the engine gives the speed of the aeroplane through the air, so that the speed of the air is known, and for a given bomb the angle at which the line of sight of the instrument must be set ahead in order that a bomb released when the object is seen in the telescope may strike that object is also known. Variations of direction of flight of the aeroplane and of strength and direction of the wind cause errors which are to some extent eliminated by further devices which will be found described in *La Nature* for June 19.

AN interesting article appears in the current number of the *Fortnightly Review* under the title "The Civil Aerial Transport Committee: A Milestone in the History of Flight." The question of the use of aircraft for commercial purposes, and especially for mail services, is treated in a very clear and practical manner. The authors of the article—Mr. C. Grahame-White and Mr. Harry Harper—consider that our present knowledge of aeronautics is sufficient to enable a machine carrying one ton of mails at 100 miles per hour to be built with ease. It is pointed out that the weather would have less effect on an aerial mail than is sometimes supposed, as a heavy machine is less susceptible to gusts than the earlier light and under-powered aeroplanes. A machine travelling at 200 miles per hour is pictured as a future possibility, but this is certainly out of the question with present-day engines. Future research will doubtless produce lighter petrol motors, but it remains to be seen whether Mr. Grahame-White's suggested gas turbine, with a weight of half a pound per horse-power, will ever become a practical proposition If such an engine were ever produced, the future of commercial aviation would indeed be bright with promise. The question of landing grounds is discussed at some length, and it is pointed out that the establishment of an aerial mail must be preceded by the setting out of a series of good landing grounds at short intervals along the route. This can, of course, be easily done, and the provision of suitable ground signs by day and night to enable the aviators to locate themselves should offer no difficulties of practical solution. Much stress is laid on the necessity of spending considerable sums on scientific research to elucidate any technical questions that may arise, in order that the establishment of a commercial air service may be attended with as few accidents and as little loss of life as possible.

THE committee appointed by the Institute of Bankers to consider the question of the adoption of a decimal coinage and the metric system of weights and measures has issued its report. As regards weights and measures, the committee is of opinion that the existing system in this country is an obstacle in the way of the extension of our foreign trade, especially of our export trade, and as a first step towards the introduction of the metric system it recommends the adoption of a decimal coinage. Retaining the pound sterling as the unit of value, the committee proposes to divide this into a thousand parts, called "mils." The gold coinage would then consist of a sovereign of 1000 mils and a half-sovereign of 500 mils, while the silver coinage would comprise pieces of 200, 100, 50, and 25 mils, of precisely the same values as existing coins. The crown and half-crown would drop out, and the bronze coinage would include pieces of 4, 2, and 1 mils. The withdrawal of the threepenny-piece is also recommended, this being replaced by a 10-mil piece having a scalloped edge, and made of nickel or some other similar metal or alloy. The committee is confident that as regards the gold and silver coinage the transition would not present any serious difficulties. The changes in the values of the bronze coins might, it is thought, cause some disturbance in the small everyday monetary transactions, but this would be slight, as the proposed pieces would be only about 4 per cent. less in value than the present bronze coins. Although the committee does not advise that the change should be made until some time after the declaration of peace, it strongly urges that the necessary legislative steps should be taken without delay.

PROF. C. BASKERVILLE, professor of chemistry in the College of the City of New York, New York City, has been appointed by the Ramsay Memorial Committee, on the suggestion of the American Ambassador, representative and corresponding member of the committee in the United States of America. Prof. Baskerville will take the necessary steps for forming a committee in the United States and for receiving subscriptions to the fund from Americans. Americans wishing to subscribe to the Ramsay Memorial Fund can send their subscriptions either to Prof. C. Baskerville or to the Rt. Hon. Lord Glenconner, honorary treasurer of the Ramsay Memorial Fund, University College, London, W.C.1.

DURING the past two years a number of cases of anthrax infection due to the use of infected shaving brushes has been recorded (nineteen cases among civilians and forty-six among soldiers). The matter has been investigated by Dr. Coutts and others, and a report on the subject has just been issued by the Local Government Board (New Series, No. 112). The anthrax infection assumed the external form, or malignant pustule. The first case was detected by Dr. Elworthy, pathologist to the West London Hospital, who proved the presence of virulent anthrax spores in the shaving brush used by the patient, and also in other unused brushes of the same pattern purchased at the shop from which the original brush was obtained. Another case of anthrax occurring about the same time was also traced to the use of an infected shaving brush purchased from a different shop. On tracing the origin of the brushes, it was found that they all came from one wholesale dealer, and were manufactured in a single factory. Inquiries made on behalf of the Board showed that the hair used in making these brushes consisted in great part of Chinese horsehair, and had not been disinfected before use. The remaining unmanufactured hair was found to be largely infected with anthrax spores. The hair in question had been invoiced as "goat's hair," which does not come under the Home Office Regulations (dealing with disinfection of Chinese horsehair), and hence had not been disinfected. In three further cases shaving brushes infected with anthrax were traced to manufacturers other than the one concerned in the first cases. In addition, four further cases were traced to brushes of foreign manufacture—Canada, New York, and Japan. The Board has under consideration what administrative action is required to secure that hair used in the manufacture of shaving brushes in this country is satisfactorily sterilised before the brushes are manufactured.

MR. C. W. HOBSON (St. James's Square, Manchester) has forwarded to us a pamphlet containing a scheme whereby the public conscience might be aroused to the significance of the loss of infant lives and means of prevention made widely known. The education of the mother in infant welfare will take a primary place in any scheme of prevention, but how this is to be effected is a difficult problem. The suggestion is that use should be made of the public Press, and that matter dealing with the care of the infant should be inserted in the advertisement columns as persistently and frequently as that directing attention to the merits of a particular soap or infants' food. In this way, it is claimed, it would meet the eye of the young mother whenever she takes up a newspaper.

LARGELY owing to the example of the late Prof. Skeat, the old unscientific treatment of local place-names has been superseded by more accurate methods. People ignorant of Anglo-Saxon and of the laws of philology had no hesitation in theorising on English place-names in a way which would not have been tolerated by classical scholars in the case of Greece or Rome. Mr. St. Clair Baddeley, who has already published an excellent manual of the place-names of Gloucestershire, has now extended his survey to those of Herefordshire in a paper published in vol. xxxix. of the Transactions of the Bristol and Gloucestershire Archæological Society. He points out that Herefordshire place-names present a particularly difficult problem, the county comprising lands which were once the battlefield between Goidel and Brython, between Roman, Silurian, and Brython, and finally between Mercian, West Saxon, and Welsh. All these races have left their traces in the local nomenclature, and the task of disentangling these varied elements has been increased by the intervention of the folk etymologist, of whose work curious examples are given. The bulk of the paper is devoted to an elaborate glossary, which will interest the historian as well as the philologist.

STUDENTS of the history of natural science may read with interest and profit Prof. R. L. Moodie's article on "The Sources of Anatomical Literature" in the *American Naturalist* for April (vol. li., No. 604). The author reckons 736 anatomists of eminence, among whom 78 were Italian, 95 British and Irish, 36 American, 127 French, and 240 German.

IN the *Journal of Genetics* (vol. vi., No. 3) Miss Edith R. Saunders continues her studies of "'Doubleness' in Flowers," dealing with the genera Meconopsis, Althæa, and Dianthus. Double flowers are "mostly female, owing to complete petalody of the andrœcium"; these, fertilised with pollen from incompletely double flowers, give double offspring. "The relation of single to double is evidently that of dominant to recessive, being thus the reverse of that which obtains in the carnation."

THE Journal of the Washington Academy of Sciences (vol. viii., No. 7) contains a summary of Dr. L. O. Howard's presidential address on "The Carriage of Disease by Insects." It is now known that 226 different disease organisms are carried by insects to man or animals, 282 species of insect-carriers being concerned. Dr. Howard regards the transmission of pellagra by Simulium as definitely disproved, and considers it unlikely that infantile paralysis is an insect-borne disease.

THE life-history of *Diapus furtivus*, a platypod beetle that bores in the sal tree in northern India, as described by Mr. C. F. C. Beeson (Indian Forest Records, vol. vi., part 1) is of much interest from the ecological, as well as from the economic, point of view. The female beetle constructs the galleries in the timber wherein the insects breed, and transports and cultivates the fungus ("ambrosia") which forms the principal food of the larvæ. The male takes no share in this work, but he is useful as a scavenger, as he collects particles of wood fibre and excrement, pushes them backwards to the end of the entrance tunnel, and expels them with a sharp jerk that entails considerable muscular effort.

THAT noxious weeds are spread by birds is well known. But a new method of dispersal is described by Mr. Charles Barnard in the *Emu* for April, where he reviews the devastation caused among the birds of Queensland by the terrible drought of 1902. Many species escaped extermination by migrating to the coast. Among these was the bustard or "plain turkey" (*Eupodotis australis*). In the skin, and even embedded in the flesh, of a specimen killed in its place of refuge the author found numbers of the "spears" of the dreaded "spear-grass." Hundreds of birds, he remarks, must thus have been infected, and these, sooner or later, will find their way back to the Western plains to scatter this scourge over the sheep country.

THE skeleton of an adult female piked whale (*Balaenoptera acutorostrata*) stranded at Crail in 1913 is carefully described by Prof. M'Intosh in the *Journal of Zoological Research* for May. Some interesting changes in the form of the skull during post-natal development are brought out by comparison between this specimen and the skull of a young male of about 9 ft. in length. Perhaps the most noteworthy feature in this description is the fact that a curious "sesamoid" bone was found "in a tendon over the third and fourth cervicals," measuring about 3⅞ in. long. So far, we believe, this is the first time that such a structure has been described. We venture to think that still further value would have been added to this memoir if the total length of the animal had been given, and if a comparison therewith had been made between this skeleton and that of Rudolphi's rorqual.

APROPOS of the construction of fleets of wooden ships in the United States, designed to defeat the German submarine menace, Mr. H. F. Weiss, in a June issue of the *Scientific American*, gives a brief summary of the main facts in regard to the life-histories of the wood-boring "ship-worms" and "wood-lice." By far the most destructive of these is the worm-like teredo. The rate at which wood exposed to its attacks is destroyed is remarkable. Sound pitch-pine piling, he remarks, driven in certain harbours on the Texas coast, were destroyed in twenty-nine days. The author utters a word of warning against the use of creosoted wood as a deterrent against its ravages, for this in no wise confers protection, while it may render cargoes of food-stuffs uneatable owing to the fumes from the wood. Copper sheathing and copper paint are the only possible agents to defeat such ravages. Compared with the teredo, the damage done by the "piddock" is negligible. Of the "wood-lice," the species known as the "gribble" is almost as much to be feared as the teredo, but it works more slowly.

THE *West Indian Bulletin* (vol. xvi., No. 2, 1917) contains several papers of importance, one of particular interest being by Sir Francis Watts on "The Recovery of Sugar at Gunthorpes Factory, Antigua, during the Years 1905–16." The contents of sucrose and fibre per hundred parts of cane are given for each year, and the tables show an unusually large amount of fibre, which has tended to increase in recent years, while the sucrose content has steadily fallen from 15·3 in 1905 to 12·5 in 1916. No adequate explanation is forthcoming, since dry seasons do not appear to affect the proportions in any way. When it is realised that a difference of one per cent in sucrose content, such as between 13·5 and 14·5, would mean an increase in output of about 1000 tons from a factory making 14,000 tons of sugar, equal to a gain of 1000*l.* on each 1000 tons of factory output, it will be recognised that there is a considerable field open for careful scientific research on both chemical and botanical lines.

IN the *American Journal of Science* for April (vol. xliii., p. 322) Mr. G. P. Merrill records further observations on the occurrence of calcium phosphate in meteorites, and places the crystals under francolite. Unlike normal apatite in igneous rocks, they crystallise out in the later stages of consolidation; but the author points out that this may be due to unknown meteoritic conditions.

MR. S. TABER's experiments on growing crystals, and his conclusion that growth against external pressure takes place only in contact with a supersaturated solution, were referred to in NATURE, vol. xcvii., p. 470. Mr. E. T. Long (*Amer. Journ. Sci.*, vol. xliii., p. 289) has now allowed hot brine prepared from table salt to cool while running through a rubber finger-stall, with a small perforation at its narrow end, and finds that the crystals not only expand the rubber, but even produce punctures. The crystals ceased to grow when the supersaturated solution was removed from their surface.

TO *Bulletins et Mémoires de la Société d'Anthropologie de Paris*, No. 5, for 1915, the publication of which has been inevitably delayed by the present war, Capt. G. G. E. Mauger contributes an interesting paper under the title of "Quelques considérations sur les jeux en Chine et leur développement synchronique avec celui de l'empire chinois." This will be of special value to those engaged in the study of the origin of chess and other games, such as draughts, and those in which dice are used.

A GLOSSARY of names in the Austrian coastlands of the Adriatic (*Prontuario dei nomi locali della Venezia Giulio*) has just been published by the Royal Italian Geographical Society (vol. xv., part ii., Memoire). It follows at an interval of a few months the glossary of the Adige region previously noted in NATURE. This glossary contains all the names, arranged in alphabetical order, on the Austrian map of the coastlands on a scale of 1 : 75,000. After each is given the Italian equivalent, and in many cases the Slav form. The Italian Geographical Society is to be congratulated on its useful publication and on its sanguine anticipation of the return of these lands to Italy.

THE statistics of Italian earthquakes during the twenty years 1891–1910 are examined by Dr. A. Cavasino in a recent paper (*Boll. Soc. Sismol. Ital.*, vol. xx., for 1916, pp. 9–31). The total number of earthquakes recorded is 5922, giving an average annual number of 296. The Calabrian earthquake of 1905 was followed by a train of 396 after-shocks, the Messina earthquake of 1908 by 1227. It is generally supposed that the greater frequency of earthquakes at night is apparent and due to the quiet of the midnight hours. Dr. Cavasino shows that this is not the case for Italian earthquakes by considering only shocks of such intensity that they could not escape notice at any hour of the day. Of these, 865 occurred during the twelve night hours, and 638 during the day hours.

AN interesting addition to the history of the invention of the achromatic telescope is made by Mr. R. B. Prosser in an article in the June number of *Notes and Queries*. Although in 1758 John Dollond was awarded the Copley medal of the Royal Society for the invention of the achromatic telescope, and is still called the inventor of the instrument in the 1912 edition of the Records of the Royal Society, it has been known for some time that the crown-flint objective had been invented previously by Chester Moor Hall, a barrister, of Essex, and the relative positions of Dollond and Hall are set forth by Miss A. M. Clerke in her biographies of the two in the "Dictionary of National Biography," and by Mr. H. D. Taylor in his article on the telescope in the "Encyclopædia Britannica." The new facts brought forward by Mr. Prosser are contained in a petition of 1764, from thirty-five opticians of London and Westminster, praying for the revocation of the patent granted to John Dollond for achromatic lenses, on the ground that such lenses were made by George Bast, optician, of Fleet Ditch, to the specification of Hall in 1733, that they were on sale by Ayscough, optician, in Ludgate Hill, and that Robert Raw, optician, of Coldbath Fields, told Dollond of them in 1755. This petition was apparently unsuccessful, for in 1766, after the death of John Dollond, his son Peter obtained a verdict against James Champneys, optician, of Cornhill, for infringement of his father's patent, and was awarded 204*l.* damages, the judge, Lord Camden, holding that Hall had not adequately "published" his invention.

A JOINT meeting of the Faraday Society and the Society of Glass Technology was held in the Department of Applied Science at the University of Sheffield on June 20, under the chairmanship of Mr. W. F. Wood. The Vice-Chancellor of the University, Dr. W. Ripper, opened the proceedings with a few words of welcome. The first paper was contributed by Prof. Fearnsides on "The Resources of Refractory Materials Available for Glass Manufacture." Refractories are to be found in different geological formations, but it is noteworthy that many of the most used substances are in the vicinity of Coal Measures. The occurrence and relative importance of various ganister and fireclay beds were discussed, and their positions indicated on a large-scale map. The resources of refractories in the West Riding of Yorkshire received particular mention, special emphasis being laid on the silica from Meltham, near Huddersfield, ganister from the neighhourhood of Sheffield, and fireclay from the Halifax district. Mr. Davidson, of the Glass Technology Department of the University of Sheffield, followed with a paper on analyses of clays and their plasticity. He also dealt with the contraction due to drying and firing. Most clays contract between 5 and 6 per cent. in drying. Firing was done at 1000° C., when a linear contraction of from 0·5 to 1 per cent. was noted, and afterwards at 1450° C., when the contraction varied from 8·75 to 11 per cent. in the majority of cases. Dr. Rosenhain spoke on the desiderata of a good refractory, and Dr. Boswell on the need of further investigation of the behaviour of pot clays, in which he hoped the glass manufacturers would take part. Mr. Spiers, the secretary of the Faraday Society, appealed to glass manufacturers to make known their difficulties regarding refractories. The main object of the Faraday Society was to concentrate on these difficulties, and up to the present considerable success had been achieved.

A CONCRETE dam of considerable magnitude—the loftiest, in fact, in the world—has recently been constructed near Boise, Idaho, U.S.A. *Engineering* of June 29 gives the following particulars of the work. The dam, which is known as the Arrowrock Dam, is 348½ ft. high (98 ft. higher than the celebrated Flatiron Building in New York City), 140 ft. thick at the bottom, and 1100 ft. long at the crest. It cost 5,000,000 dollars to construct, and forms part of a scheme involving an outlay of 12,000,000 dollars. In the execution of the work, 683,000 cu. yds. of spoil were removed, and 610,000 cu. yds. of concrete deposited, with 1,350,000 lb. of steel reinforcement and 1800 tons of structural steel. The object of the dam is to provide a store of water for irrigation purposes to serve an area of some 240,000 acres. The reservoirs will accommodate 240,000 acre-feet, and will be fed from the surplus flow of the Boisé River, in the late winter and the early spring, when the river is in torrent. An interesting feature of the work is the means provided for dealing with 3,000,000,000 cu. ft. of merchantable timber, located in the basin of the river above the dam, for which the river forms the only practicable exit. A cable lift is installed for handling the logs and depositing them on a concrete deck at the top of the dam, whence they are transferred by spiked rolls to a chain, which conveys them to a gravity shoot, where they slide down into the river below. It is stated that the dam has already amply justified its existence by saving the crops on 100,000 acres, and that this economy alone would be almost sufficient to defray the total cost of the work.

IN a paper on "Some Compounds of Boron, Oxygen, and Hydrogen" (published by Messrs. H. K. Lewis and Co.) Dr. Travers, with Messrs. N. M. Gupta and R. C. Ray, describes a series of compounds prepared by the action of water and of ammonia on magnesium boride, B_2Mg_3. These compounds, examined mainly in aqueous solution, include a dioxide, B_2O_2, an oxide, B_4O_5, and a sub-oxide, possibly B_2O, as well as a series of borohydrates, $B_x(H_2O)_y$, analogous with the carbohydrates.

OUR ASTRONOMICAL COLUMN.

THE NEBULÆ AND STELLAR EVOLUTION.—A full report of Prof. W. W. Campbell's address as retiring president of the American Association for the Advancement of Science is given in *Science* (vol. xlv., No. 1169). The subject chosen was "The Nebulæ," and, besides giving an interesting account of the development of our knowledge of these objects, with an abundance of fine illustrations, Prof. Campbell clearly stated his views as to the place of the nebulæ in the cosmical scheme. As to the spiral nebulæ, Prof. Campbell considers the hypothesis that they are independent stellar systems, or "external universes," to be in best harmony with the known facts. As regards the gaseous nebulæ, while a strong case can be made out for the evolution of planetary nebulæ into stars, it cannot safely be concluded that all stars have been developed from nebulæ of this class; their comparative scarcity and their relatively high velocities are decidedly against such a conclusion. A much stronger case can be made out for the hypothesis that the stars in general have evolved from irregular nebulæ, which have spectra identical with those of the planetaries. These nebulæ are closely related spectroscopically to the bright-line stars, and these again to the early class B stars, and from thence the sequence can be traced through the Sirian and solar types to the red stars. This is regarded by Prof. Campbell as the most probable course of stellar evolution. Facts as to the distribution of nebulæ and of the different classes of stars seem to him to be opposed to the view that some of the red stars may be at an early stage of evolution.